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DECKER COAL COMPANY - NORTH EXTENSION 1982

DRAFT

Supplement to the Final Environmental Impact Statement

Proposed Plan of Mining and Reclamation
East Decker and North Extension Mines

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TABLES

I. DESCRIPTION OF THE NORTH EXTENSION MINE PLAN

A. INTRODUCTION:

Decker Coal Company submitted an application to the Department of State Lands for a permit to mine coal in the North Extension (North Decker) area on May 19, 1975. Many reasons led to inaction on the application. Decker Coal Company is currently operating two other mines in the Decker area: the West Decker Mine, located immediately to the south of the proposed North Extension, and the East Decker Mine, located across the Tongue River Reservoir to the southeast of the proposed North Extension.

A Final Environmental Impact Statement (FEIS) for the North Extension proposal was published in 1977, by the U.S. Geological Survey, Department of the Interior and the Montana Department of State Lands. The FEIS is cited as: Final Environmental Impact Statement, Proposed Plan of Mining and Reclamation, East Decker and North Extension Mines, Decker Coal Company, Big Horn County, Montana. Copies of this document are available at the Office of Surface Mining, U.S. Department of the Interior, Brooks Towers, 1020 - 15th Street, Denver, Colorado 80202, phone (303) 837-5511, or Department of State Lands, Reclamation Division, Capitol Station, 1625 Eleventh Avenue, Helena, Montana 59620, phone (406) 449-4560.

A resubmittal of the application for Decker's proposed North Extension Mine was received by the Department of State Lands on January 8, 1981. It is this resubmittal that necessitates the issuance of this supplemental EIS.

The proposed five-year permit area of application #00026 (North Extension) includes 1,025 acres. Only minor acreage changes have occurred since the FEIS was completed. Two thousand three hundred and two (2,302) acres will be mined in the proposed North Decker life-of-mine operation over a period of approximately 24 years. Production from the North Extension is projected to be a steady 2.4 million tons per year. Total production for the life-of-mine is expected to be about 57.4 million tons.

The North Extension is located north of the existing West Decker Mine, and approximately 25 miles to the north of Sheridan, Wyoming. The proposed permit area includes portions of Sections 32, 33, and 34 of Township 8 South, Range 40 East and portions of Sections 3, 4, 9, and 10 of Township 9 South, Range 40 East, a Montana Principal Meridian, Big Horn County, Montana (see Figure 1).

B. MINING SEQUENCE:

The mine plan for the North Extension is basically the same as that described in the Final EIS (1977, pp. 53-77). However, the reclamation plan has been changed (see Section C, Reclamation). Decker Coal

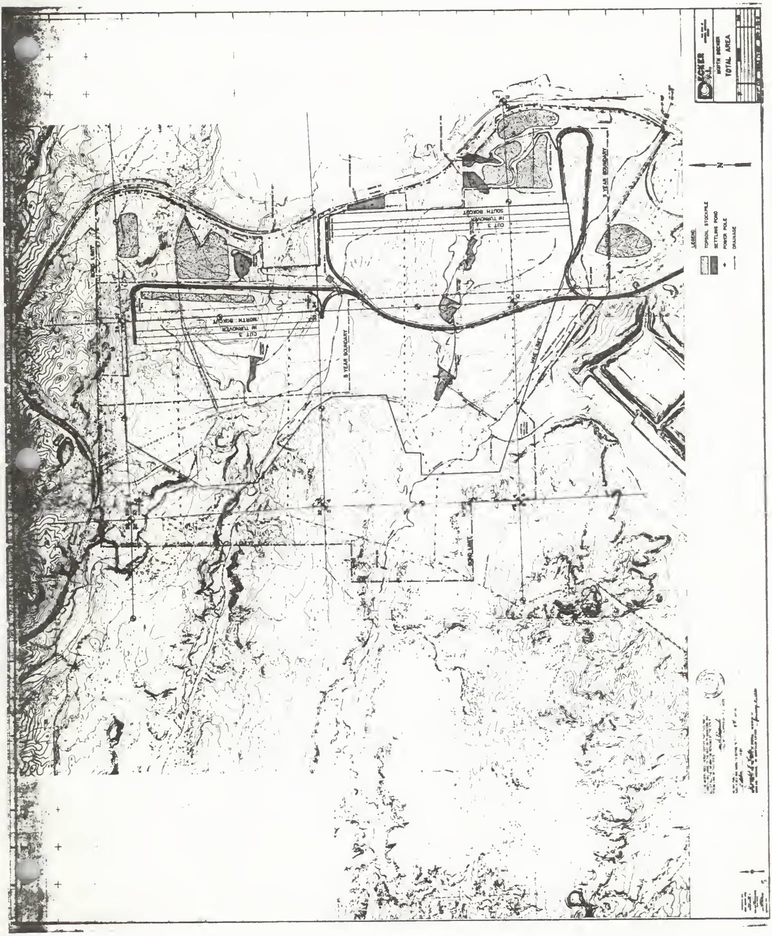


Figure 1. Total Area (Permit) Map

Company's submittal proposes mining operations covering 2,946 acres immediately to the north of the present West Decker operation; mining level of disturbance (pits, haul ramps, spoil piles) will occupy 1,025 acres while other minor disturbances (topsoil stockpiles, ponds, etc.) will occupy the remaining 1,921 acres. Decker Coal Company's present plans include transferring some of these 1,921 acres to active mining level at the end of five years by means of a new five-year permit.

C. RECLAMATION:

Significant changes have occurred in the reclamation plan since the Final EIS was published.

1. Spoil Reclamation:

The proposed postmining topography, Figure 2, has been modified from the original submission (FEIS, p. 67, Figure 19). Both the Spring Creek and Pearson Creek drainages will be restored. Other dominant features of the reclaimed surface include two knob-like ridges, one located between the two drainages, the other in the northwestern section of the proposed permit area. The elongate, shallow, V-shaped depression along the western edge of the proposed mine area has been reduced. The majority of the slopes on the interior of the mined area will be graded to slopes of 25:1 or less, while the final highwall slopes and final pit slopes will be graded to a 5:1 or less.

2. Topsoiling:

All suitable soil material (including A, B and C horizons) will be salvaged by the company for reclamation purposes. The total depth of salvage and the thickness of each lift in any specific location will be based on site-specific chemical and physical analyses to determine suitability. Salvaged topsoil materials will be stockpiled in locations designated on Figure 1.

The final regraded spoils surface will be scarified and the stockpiled topsoiling materials will be placed to uniform depths with scrapers in two lifts. Calculations provided by the company in its application indicate that an average of 37 inches of suitable topsoil material is available for respreading on the mine for the projected life of the operation. The actual proposed depths of replaced topsoil consist of four feet in the main drainages and 2.5 feet on all other areas. Decker has proposed to amend soils at the time of seeding with 200 lbs/acre of an 18-46-0 fertilizer formulation and to amend them once again at the same rate the following year.

3. Seeding:

Decker Coal Company proposes to reclaim the mine area to a postmining land use of livestock and wildlife grazing (Permit Application, p. 447, Vol. VII). This will be accomplished by establishment of a diverse, effective and permanent vegetative cover of

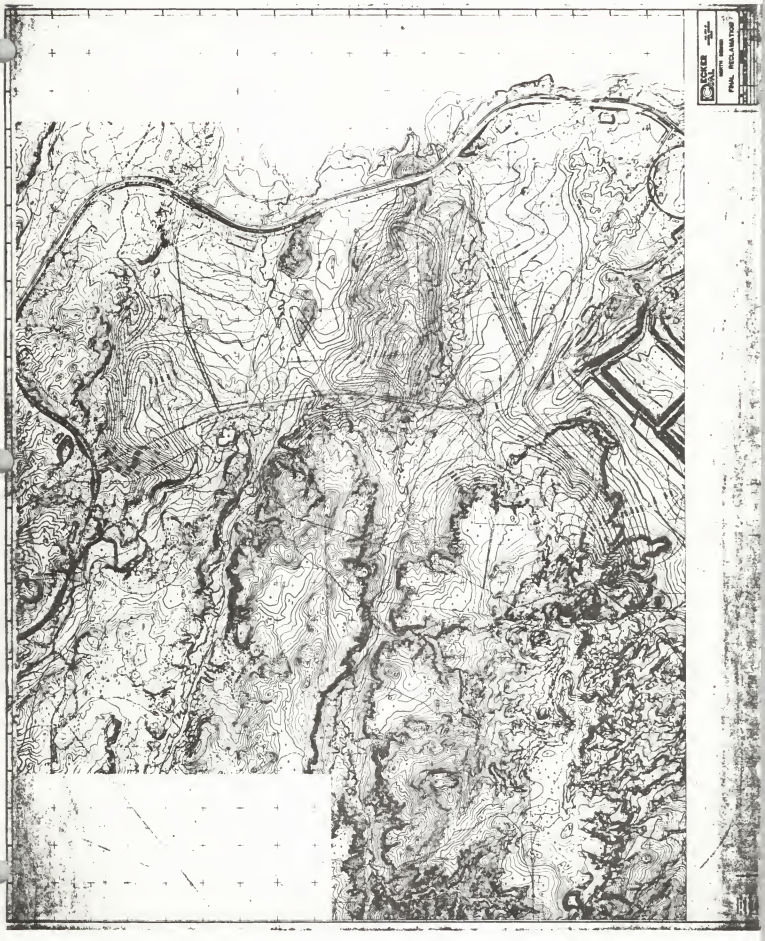


Figure 2. Final Reclamation Map

the same seasonal variety, as is native to the area, that will support livestock and wildlife grazing. Seeding and planting of disturbed areas will be conducted during the first normal period for favorable planting conditions after final preparation, but not more than 90 days after topsoil has been replaced. Introduced species will be used only on approval of the Department and only after field trials have shown that the introduced species are of equal or better utility for the postmining land use.

The variety, species, seeding rates and soil amendment practices to be used on the North Extension reclamation were determined by Decker coal company and the Department in conjunction with the U.S. Soil Conservation Service. Two main seeding mixtures will be used: one for upland areas, and another for grassed waterways (Permit Application pp. 383, 384, Vol. V).

Seed for species that exist on-site of forbs and shrubs is presently being collected at West Decker and will be collected in the North Extension. However, when necessary, seed will also be purchased. The seed for forbs and shrubs will be planted with the upland seed mixture (Permit Application, p. 384, Vol. V).

D. PUBLIC HIGHWAY RELOCATION:

The relocation of Route FAS 314 was started in 1979 and completed in 1980. The existing road/railroad alignment is shown in Figure 1.

E. PROPOSALS FOR OTHER DEVELOPMENTS IN THE AREA:

Other mines and coal-related development in the Decker area are discussed below (Figure 3).

1. Decker Coal Company Operations in the Area:

The East Decker surface mining permit was granted in July 1977 for approximately 4,000 acres. A permit application to include additional acreage was submitted to the Department in July 1981.

In March 1981, a West Decker permit for an additional 770 acres of mining level disturbance was issued by the Department of State Lands.

2. Development of Coal in the Spring Creek Watershed:

Spring Creek Coal Company was issued a surface mine permit by the Department in April 1979 for approximately 3,000 acres.

3. Ongoing and Proposed Mines in the Tongue River Valley and Adjacent Areas:

The locations of coal-related developments in the Tongue River valley and adjacent areas are shown in Figure 4. The status of proposed mines is described below.

MONTCO (Ashland - Birney area) submitted a permit application

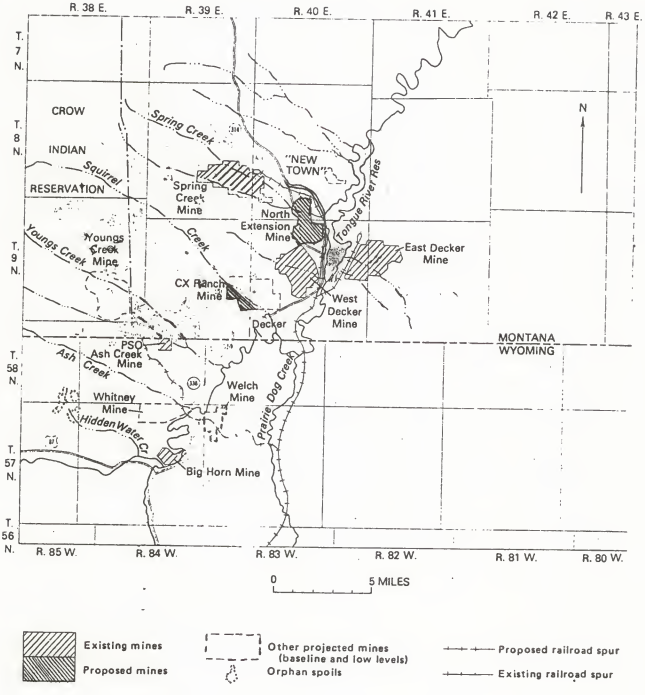
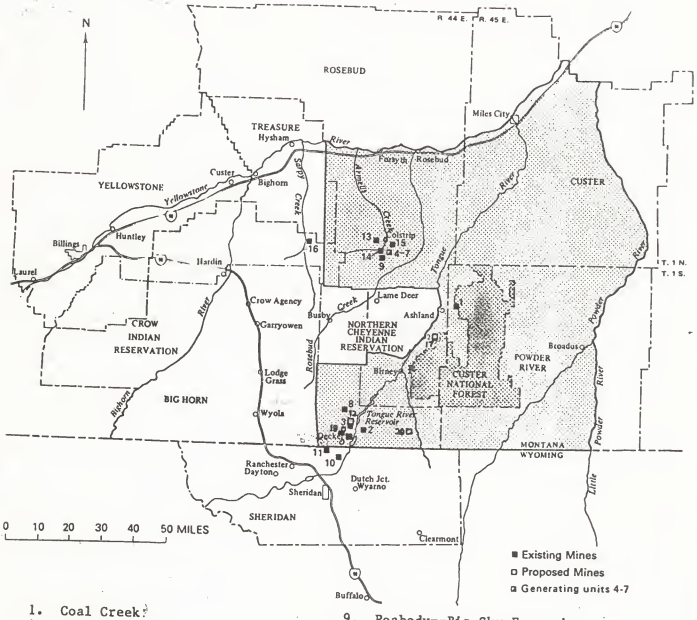


Figure 3. Coal Related Developments in the Decker Area



1. Coal Creek
2. Decker--East
3. Decker--West
   Montana Power Co.--
   generating units
4. #1
5. #2
6. #3
7. #4
8. NERCO--Spring Creek
9. Peabody--Big Sky Expansion
10. Peter Kiewit--Big Horn
11. Pub. Serv. Okla.--Ash Creek
12. Decker--North
13. Western Energy--Rosebud Area A
14. Area B
15. Area E
16. Westmoreland--Absaloka
17. MONTCO--North King
18. CONSOL--CX Ranch
19. Peter Kiewit--Wolf Mountain
20. Amoco--Hanging Woman

FIGURE 4. --Intermediate level of production--location of ongoing and proposed mines and generating units.

to the Department of State Lands in November 1980. A Consolidation Coal Company (CX Ranch) permit application was received by the Department in December 1981. A permit application from Peter Kiewit Son's Company (CX Ranch - Wolf Mountain) is expected in early 1982. Amoco has indicated an interest in mining an area along the upper reaches of Hanging Woman Creek. Interest has been expressed in coal reserves by a number of companies in Otter Creek, east of the MONTCO project area.

II. EXISTING ENVIRONMENT

A. GENERAL ENVIRONMENT:

The physical and biological environments of the proposed permit areas are described in the Final EIS (pp. 88-255).

The general area described in the FEIS lies near the western edge of the Great Plains physiographic province within sight of the Bighorn Mountains. The area surrounding the proposed permit area - referred to as the Decker area - is in the southeast corner of Big Horn County about five miles north of the Montana-Wyoming State Line and about 20 miles northeast of Sheridan, Wyoming (Figures 3 and 4). Sheridan is the only community of appreciable size within a radius of about 50 miles.

The Decker area, which takes its name from the nearby Decker Post Office, lies astride the Tongue River Reservoir (Figure 3). The valley of the Tongue River drains generally northward across the west-central part of the Decker area, dividing it into eastern and western segments. This central valley reach is somewhat wider and flatter than corresponding reaches upstream and downstream forming a reservoir basin that has been partially flooded by construction of a dam across the Tongue River about two and a half miles north of the Decker area. The area west of the Tongue River Reservoir is drained by three uphemeral streams: Spring Creek, Pearson Creek and Pond Creek.

The climate in the Decker area is the continental steppe type of the Northern Great Plains area. It is semiarid and characterized by cold winters, warm summers, and a large variation in annual and seasonal precipitation and temperature. The plant communities present in the Decker area are fairly representative of the Montana Mixed Prairie Association. Grassland associations exhibit a mixture of cool-season bunchgrass and low-growing shrubs, as well as short-tuft and sod-forming grassing and xerophytic sedges.

Baseline inventory of wildlife began in 1974 for the North Decker proposed permit area. Preliminary surveys were conducted by Decker Coal Company and consulting firms. Baseline information on seasonal distribution, habitat use and population characteristics of wildlife species in the proposed Decker mine area is available in the FEIS (pp. 223-255) and the Application (Volume III).

B. SOCIO-ECONOMIC:

There are currently about 1,190 persons employed at the Decker area coal mines (Table 1). The North Extension would require at the most 26 additional employees (Table 2) and so there would not be an appreciable affect in any socio-economic area other than public revenues. The North Extension would allow the company to produce eight million tons per year from the West side, up from this year's projected 5.4 million tons but below the 1977 peak production of 10.4 million tons (Table 3).

TABLE 1

Employment at Decker Area Mines in 1981

Mine	Employment
Decker - West	244
Decker - East	400
Spring Creek	254
Big Horn	292
TOTAL	1,190

TABLE 2

Past and Projected Future Employment at West Decker
(with North Extension), 1975 to the End of Mine Life

[Source: Decker Coal Company, written communication, November 16, 1981]

	West Decker		North Extension		
Year	Craft	Overhead*	Craft	Overhead*	Total
1974	156	61	---	---	217
1975	248	60	---	---	308
1976	274	60	---	---	334
1977	378	91	---	---	469
1978	264	70	---	---	334
1979	216	49	---	---	265
1980	178	53	---	---	231
1981	186	58	---	---	244
1982**	176	50	45***	15	286
1983**	176	50	34	10	270
1984 to end of mine life**	176	50	34	10	270

* Includes clerical and security
** Projected employment, the actual work force active in the West and North will depend upon the production level
*** Includes construction phase employment

TABLE 3

Past and Projected Future Production at West Decker (with North Extension), 1972-2006 (millions of tons)

[Source: Decker Coal Company, written communication, November 16, 1981]

Year	West	North	Total	Year	West	North	Total
1972	0.8	---	0.8	1992	6.2	1.8	8.0
1973	4.2	---	4.2	1993	5.9	2.1	8.0
1974	6.9	---	6.9	1994	6.3	1.7	8.0
1975	9.2	---	9.2	1995	5.9	2.1	8.0
1976	10.2	---	10.2	1996	5.7	2.3	8.0
1977	10.4	---	10.4	1997	5.3	2.7	8.0
1978	6.9	---	6.9	1998	5.5	2.6	8.0
1979	7.1	---	7.1	1999	5.7	2.3	8.0
1980	5.6	---	5.6	2000	3.9	4.1	8.0
1981*	5.4	---	5.4	2001	5.7	2.3	8.0
1982	4.0	0.7	4.7	2002	5.4	2.6	8.0
1983	3.4	2.3	5.7	2003	6.3	1.7	8.0
1984	5.0	2.4	7.4	2004	4.2	3.8	8.0
1985	6.2	1.8	8.0	2005	6.1	1.9	8.0
1986	4.7	3.3	8.0	2006	7.7	---	7.7
1987	5.3	2.7	8.0				
1988	5.5	2.5	8.0				
1989	5.6	2.4	8.0				
1990	5.3	2.7	8.0				
1991	6.6	1.4	8.0				

* From 1981 onward the projected procution figures could be significantly affected by changes in sales contracts or scheduling.

The North Extension would produce federal revenues in the form of royalties, payments to the Abandoned Mine Reclamation Fund and the Black Lung Excise Tax. The State of Montana would benefit principally from the Coal Severance Tax and the Resource Indemnity Trust Tax. Big Horn County and area school districts would receive revenues in the form of property taxes.

The terms of the federal leases for the North Extension require royalty payments of 15 cents per ton. When these leases are renewed in 1983 and 1984 current federal regulations require royalty payments based on a percentage of the FOB price. Assuming the minimum percentage (12.5) and 1980 average prices, federal royalties will go from 15 cents to $2.29 per ton. Royalties form part of the base of the Montana Coal Severance Tax--the contract sales price--and so even at 1980 prices the severance tax per ton will go up. Public revenues are summarized in Table 4.

TABLE 4

Public Revenues from the Proposed North Extension Mine During the Permit Period, 1982-86 (thousands of 1980 dollars)

	Federal Government			State and Local Governments		
Year	Royalties[1]	Abandoned Mine Reclamation[2]	Black Lung Excise Tax[3]	Severance Tax[4]	REIT[5]	Property Taxes[6]
1982	$ 106.0	$ 247.4	$176.7	$ 2,339.8	$ 39.0	$ 301.5
1983	727.5	793.0	566.4	7,606.4	126.8	981.2
1984	5,224.5	849.3	606.7	9,487.4	158.1	1,223.9
1985	4,194.4	641.1	457.9	7,234.8	120.9	932.3
1986	7,474.6	1,142.4	816.0	12,892.8	215.4	1,661.4

[1] $0.15 per ton until lease renewal and then 12.5 percent of FOB price

[2] $0.35 per ton

[3] $0.25 per ton

[4] 30 percent of contract sales price

[5] Resource Indemnity Trust Tax, 0.5 percent of contract sales price

[6] Assumes 86 mills

C. AIR QUALITY:

Some deterioration of downwind ambient air quality adjacent to the proposed permit area has occurred. Total suspended particulate (TSP) data submitted through December 1980 shows annual average concentrations well below the Federal and State ambient air quality standards.

In October 1980, an air quality permit was issued to Decker coal Company for its West and North Extension Pits by the Montana Department of Health and Environmental Sciences.

D. ALLUVIAL VALLEY FLOOR ASSESSMENT:

The Department of State Lands has concluded that neither Spring Creek nor Pearson Creek qualify as alluvial valley floors within the proposed North Extension area due to insufficient water for subirrigated or flood irrigated agricultural activities. (See letter from Hemmer to Shelso dated November 28, 1979 in Appendix A).

III. ENVIRONMENTAL IMPACTS OF THE PROPOSAL

A. OVERBURDEN:

Trace elements and sodium found in the overburden will be spoiled well below the surface and because of their relatively low contents, no problems with vegetation or groundwater quality should be encountered.

Interburden material with high SAR's will be found near the regraded surface over approximately 1/3 of the mine area. This material is less sodic than at West Decker (average of SAR's at West Decker is 28 compared to 18 at North Decker). Materials found southwest of the permit area (on the West Decker permit area) will be borrowed for highwall backfilling at the final south pit at North Decker. Overburden will be removed to a maximum depth of approximately 100 feet. Some of this material is sodium-affected, has high pH's, and exhibits elevated saturation percentages. This last characteristics suggests that the clay mineralogy of the material affected is dominated by smectite.

It therefore appears that in the southern portion of the North Decker permit area, sodic spoils will probably become evident at or near the regraded spoil surface. Tests conducted at West Decker have not shown that the placement of sodic spoil directly below topsoil has been detrimental to revegetation efforts. Since topsoil distribution depths will be greater at the North Decker site than at West Decker (see Topsoil section of TEA), the probability of revegetation success at North Decker should be at least as great as that at West Decker. However, the ultimate outcome of revegetation efforts, in particular, and reclamation efforts in general at West Decker has yet to be conclusively demonstrated.

B. TOPOGRAPHY AND GEOMORPHOLOGY:

The postmining topography has been greatly altered from the original proposal to reduce the erosion potential of reclaimed drainages and hillslopes and to better reflect the approximate original contour.

Impacts on topography and geomorphology would not be significant because the company's proposed mine plan would minimize erosion over the long term. Erosion on the reclaimed minesite would at first be higher than on most native range lands near Decker, but erosion rates are expected to approach premining levels within three to four years after revegetation.

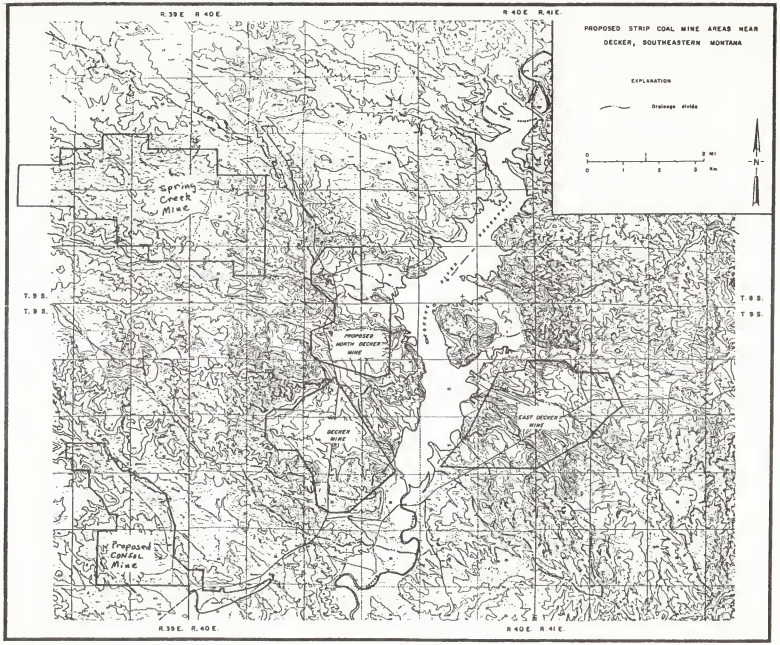
Until the area has been revegetated, erosion rates may be fairly high; however, ponds would capture most of the eroded sediment and prevent it from reaching streams off the minesite. If revegetation succeeds and postmining land management practices foster a good vegetative cover, then erosion rates at North Decker would probably be similar to that which existed before mining. The company would not be allowed to remove the sediment ponds until it demonstrated that erosion rates were no higher than before mining; therefore, the amount of sediment reaching offsite areas would be no greater than before mining.

The following measures are part of North Decker's mine plan and will help to control erosion at the mine: all slope angles will be 20 percent or less; a relatively dense network of drainages will be constructed; topsoil will be placed along the topographic contours; and one ton/acre of wood fiber mulch will be applied to freshly topsoiled areas.

Reconstructed drainage design imitates the premining geomorphic configuration of drainages. In particular the gradient of drainages is similar to the premining gradient and no oversteepened sections will be graded into any drainage. By approximating the premining geomorphology in this fashion, postmining channel erosion should be minimized

C. CUMULATIVE HYDROLOGIC IMPACTS

The cumulative hydrologic impact of anticipated mining in the near future in the Decker Area has been evaluated by Van Voast and Hedges (1975) and by Consol (1981). The hydrologic effects considered most important are the cumulative drawdown in aquifers, and postmining water quality. The effect of discharge of mine effluent waters into the Tongue River and disruption of regional groundwater flow patterns were also studied, but were not expected to have significant overall impacts. Three existing mines, (West Decker (Montana DSL, 1980), East Decker (USGS-Montana DSL, 1977) and Spring Creek (Spring Creek Coal Co., 1979; USGS-Montana DSL, 1979)), two proposed mines (Consol and PKS in the Squirrel Creek drainage), and the proposed expansion of the Spring Creek mine are considered in addition to the North Decker extension (Figure 5).



Base from U.S. Geological Survey 7 1/2 min Half Moon Hill, Tongue River Dam, Spring Gulch, Pearl School, Decker, and Holmes Ranch quads

Figure 5. Existing and Proposed Strip Coal Mine Areas Near Decker, Southeastern Montana

Drawdown has been shown to extend one to two miles from the mine pits at West Decker (Figure 6). Drawdown in the Anderson-Dietz--1 and Dietz--2 coals were 40 and 15 feet respectively in wells very close to the mine. Northwest, west and southwest of the mine, declines have been about ten feet within a radius of 1 1/2 to 1 3/4 miles. Water level declines east of the mine have been much less because of recharge from the Tongue River Reservoir and alluvium. The reservoir and alluvium are a hydrologic barrier for the Anderson-Dietz--1 seam between the North and West Decker areas and the East Decker area. Drawdowns between adjacent mines west of the Tongue River overlap due to their close proximity, increasing the impact on any wells located between them.

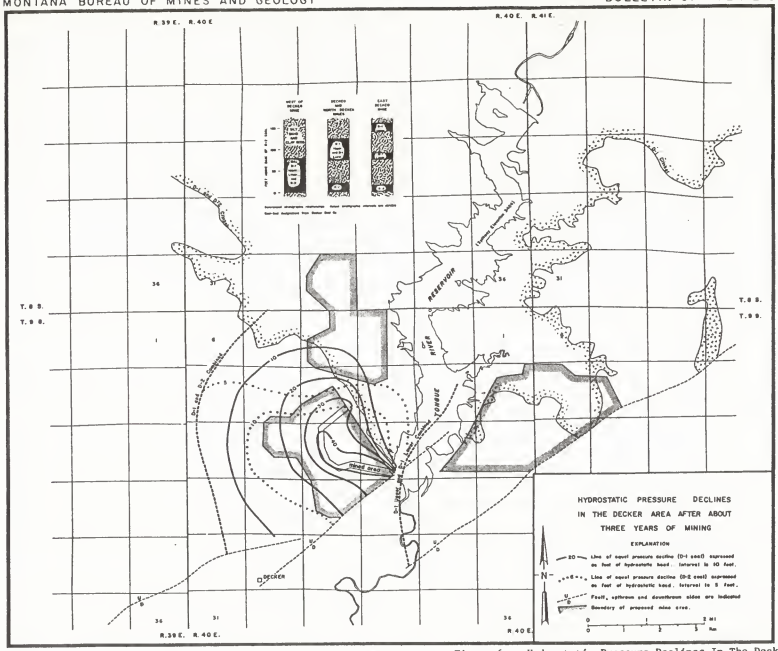
Water level declines in the North Decker area are expected to be smaller in magnitude in the D-1 coal than in the West Decker area. This will primarily be due to the close proximity of the D-1 burn recharge and the high permeabilities within the burn area. Declines in the D-2 are anticipated to be similar in magnitude to those observed for the D-1 at West Decker. Potentiometric declines for the D-3 coal, which will not be disturbed by mining are difficult to predict (Decker coal Company, 1981).

The largest declines in the aquifers will occur in conjunction with the initial pit opening. Water levels will decline to an equilibrium condition and this condition will exist in close proximity to the active pit. This water level depression will advance with the pit progression and will remain fairly constant during mine operation.

Wells and springs within two miles of any mine will potentially have a lowered water level and discharge (Figure 6). Springs and wells within the actual mined areas will be destroyed. Table 5 is an inventory of all known wells and springs compiled from Environmental Impact Statements and Permit Applications of all the active and proposed mines in the Decker area. Potential impacts to the wells and springs are indicated. Thirty-seven wells and three springs will be destroyed by mining, 15 wells and two springs will experience severe drawdown, 21 wells and one spring will experience moderate drawdown and 43 wells and four springs will experience a slight to negligible influence due to mining. Within a two mile radius of the proposed North Decker mine, eight wells and two springs will be destroyed by mining, nine wells and two springs will be severely impacted and 26 wells and two springs will experience slight to moderate effects from mining.

After the first two years of mining, at West Decker, Van Voast and Hedges (1975) noted the rates of water level declines began to stabilize, indicating the groundwater system was approaching a new equilibrium. Thus, it is expected that in the North Extension the size of the area affected by drawdown will increase as mining progresses, but the rate of water level decline will probably remain fairly constant.

The pattern of groundwater movement in the Decker area in general



Base from U.S. Geological Survey 7 1/2 min Half Moon Hill, Tongue River Dam, Spring Gulch, Pearl School, Decker, and Holmes Ranch quads

Figure 6. Hydrostatic Pressure Declines In The Decker Area After About Three Years of Mining

Table 5 COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
1-C*	14-9S-39E ACBC	Stock	3660	36	Alluvium	16	15	---	Possible minor dewatering
2-C	14-9S-39E BDAD	Domestic	3650	300	D-1, D-2 Coal	----	----	Yes	Probable moderate to severe drawdown
3-C	14-9S-39E DCBB	Unused	3647	391	sub D-2	160.9	----	---	Destroyed by mining
4-C	24-9S-39E ACDA	Unused	3590	235	D-1, D-2 Coal	88	10	---	Probable severe drawdown
5-C	24-9S-39E DCDC	Domestic	3610	244	D-1, D-2	106	10	---	Destroyed by mining
6-C	25-9S-39E DDC	Unused	3590	150	D-1, Over-burden	----	10	---	Destroyed by mining
7-C	3-9S-39E ACAB	Unused	3424	200	sub D-2	SWL above ground surface	33	Yes	Slight to moderate drawdown with recharge from Tongue River Reservoir
8-C	3-9S-40E CCCD	Stock	3478	90	D-2	50.9	----	---	Destroyed by mining
9-C	3-9S-40E CDCD	Stock	3465	98.5	Anderson Clinker (?) D-1, D-2	35.85	----	---	Destroyed by mining
10-C	3-9S-40E DCAB	Unused	3440	462	sub D-2	3	4	---	Destroyed by mining
11-C	4-9S-40E CBAD	Stock	3542	160	D-2	95	10	---	Destroyed by mining
12-C	10-9S-40E CACC	Ind.	3465	980	sub D-2	42	90	---	Little or no drawdown
13-C	10-9S-40E CDC	Ind.	3482	150	----	125	30	---	Slight to moderate drawdown

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
14-C	10-9S-40E COO	Ind.	3450	150	---	110	30	---	Slight to moderate drawdown
15-C	10-9S-40E COO	Ind.	3452	140	---	27	31	---	Slight to moderate drawdown
16-C	10-9S-40E COOO	Ind.	3450	150	---	125	30	---	Slight to moderate drawdown
17-C	10-9S-40E COOO	Ind.	3465	498	O-3, O-4, O-5	29	60	---	Little or no drawdown
18-C	10-9S-40E OOBA	Ind.	3452	160	SS & O-2	23	20	Yes	Slight to moderate drawdown
19-C	15-9S-40E BAA	Ind.	3425	300	---	250	50	---	Little or no drawdown
20-C	15-9S-40E BABA	Ind.	3465	498	sub O-2	23	---	---	Little or no drawdown
21-C	15-9S-40E OCB	Ind.	3430	53	O-1 & sub O-1	2	125	---	Probable moderate drawdown mitigated by recharge from reservoir
22-C	15-9S-40E OCOC	Stock	3425	17	Alluvium	11.8	---	---	Little drawdown from mining
23-C	15-9S-40E OCOO	Dom.	3430	34.9	Alluvium	12.1	---	---	Litte drawdown from mining
24-C	17-9S-40E ACAC	Unused	3550	180	O-1	111.2	---	Yes	Destroyed by mining
25-C	21-9S-40E CACO	Dom.	3554	110	O-1 & Over-burden	54.64	---	Yes	Destroyed by mining
26-C	21-9S-40E CCAC	Unused	3642	200	O-1 & Over-burden	131.6	---	---	Severe drawdown from mining

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
27-C	21-9S-4DE CDAC	Unused	3565	280	D-1	123	---	---	Severe drawdown from mining
28-C	21-9S-4DE CDBA	Dom.	3577	400	Canyon Coal	30	---	---	Severe drawdown from mining
29-C	21-9S-40E CD88	Dom.	3578	---	Unknown	---	---	---	Severe drawdown from mining
30-C	21-9S-4DE CD8D	Commerial	3574	227	D-1	117	5	Yes	Severe drawdown from mining
31-C	21-9S-4DE DC88	Unused	3560	275.5	Anderson D-1 Coal?	124.7	---	---	Severe drawdown from mining
32-C	21-9S-4DE DD8A	Stock	3502	171	SS	26	20	---	Severe drawdown from mining
33-C	22-9S-4DE DAAD	Stock	3455	269	D-1	40.7	5	Yes	Moderate drawdown mitigated by recharge from Tongue River allumvium
34-C	22-9S-40E DADA	Dom.	3460	580	D-3, D-4, D-5	25	30	Yes	Slight drawdown and possible recharge from Tongue River alluvium
35-C	27-9S-4DE CCAC	Dom. Stock	3440	260	Anderson D-1	SWL above ground level	5	Yes	Slight drawdown mitigated by recharge from Tongue River alluvium
36-C	28-9S-40E DABC	Stock	3460	260	Anderson D-1	SWL above ground level	2	---	Slight drawdow mitigated by recharge from Tongue River alluvium
37-C	28-9S-40E DABC	Stock	3475	600	sub D-2	SWL above ground level	1	Yes	Slight drawdown mitigated by recharge from Tongue River alluvium
38-C	29-9S-40E CCAD	Unused	3525	155	D-1	20	30	---	Slight drawdown mitigated by recharge from Squirrel Creek alluvium
39-C	29-9S-4DE CCAD	Dom.	3520	153	D-1	39	30	Yes	Slight drawdown mitigated by recharge from Squirrel Creek alluvium

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
40-C	29-9S-40E DBDB	Public	3560	---	Anderson/ D-1(?)	---	---	---	Small to moderate drawdown
41-C	30-9S-40E ABDD	Dom.	3545	---	Anderson/ D-1	---	---	---	Slight to moderate drawdown mitigated by recharge from Squirrel Ck. alluvium
42-C	30-9S-40E BBA	Stock	3570	238	D-1	100	18	---	Slight to moderate drawdown mitigated by recharge from Squirrel Ck. alluvium
43-C	31-9S-40E ACC	Dom.	3470	---	---	---	---	---	Slight to moderate drawdown mitigated by recharge from Tongue River alluvium
44-C	22-58N-83W DA	Dom.	3475	155	---	145	---	---	Little to no drawdown
45-C	23-58N-83W CD	Dom.	3470	160	---	150	---	---	Little to no drawdown
46-C	23-58N-83W CD	Stock	3470	25	---	15	---	---	Little to no drawdown
47-C	32-9S-40E ACDA	Dom.	3460	20	Alluvium	5	---	---	Little to no drawdown
1-D**	22-8S-40E SWNWNW	Unused	3620	275	D-1, cl, D-2 sub D-2	118.3	---	---	Little or no drawdown
2-D	28-8S-40E SENWNE	Stock	3543	107	D-2, cl	81.0	---	---	Possible minor drawdown
3-D	31-8S-40E SENWNE	Stock	3615	145	D-2	96.2	---	---	Destroyed by mining
4-D	33-8S-40E NWSESWNE	Stock	3483	---	D-2	54.2	0.5	Yes	Destroyed by mining
5-D	33-8S-40E NWSESWNW	Stock	3513	89	D-1, cl, D-2	28	---	---	Destroyed by mining

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
6-D	34-8S-40E NENESENW	Stock	3457	53	D-1, cl	33	10	Yes	Destroyed by mining
7-D	34-8S-40E NENESENW	Dom.	3456	40	D-1, cl	30	---	---	Destroyed by mining
8-D	34-8S-40E NENWSENW	Dom.	3457	98	D-1, sub D-2	13	5	---	Destroyed by mining
9-D	21-8S-41E NENWSW	Stock	----	125	----	60	15	---	Probably not affected
10-D	21-8S-41E SWNWNESW	Stock	3733	99	D-1, cl	81.7	---	Yes	Probably not affected
11-D	32-8S-41E NWNWNW	Stock	3635	196	D-2	93.1	---	---	Probably not affected
12-D	34-8S-41E SWSWNW	Stock	3670	181	D-2	85.4	---	---	Probably not affected
13-D	Same as Consol #21								
14-D	1-9S-40E NESWSW	Stock	3445	125	D-2	26.4	---	---	Possible minor drawdown with some recharge from Deer Creek alluvium
15-D	3-9S-40E NWNESWNW	Stock	3424	200	sub D-2	---	33	Yes	Destroyed by mining
16-D	Same as Consol #10								
17-D	4-9S-40E NWNESESW	Stock	3542	---	D-2	95	10	Yes	Destroyed by mining
18-D	5-9S-40E SWSWNENW	Stock	3580	260	sub D-2, D-3	70	6	---	Moderate drawdown, possibly severe
19-D	7-9S-40E SWSENW	Stock	3720	274	D-1 & overburden	138	50	---	Slight drawdown

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
20-D	11-9S-40E SESENE	Dom.	---	100	---	---	10	---	Moderate drawdown from mining possibly mitigated by recharge from Tongue River Reservoir
21-D	11-9S-40E NESENE	Stock	3430	32	D-1 - lower	17.5	---	---	Moderate drawdown mitigated by recharge from Tongue River Reservoir
22-D	13-9S-40E NENENESW	Stock	3500	108	D-1 - upper	63.4	---	---	Destroyed by mining
23-D	13-9S-40E SESWSWSE	Stock	3520	75	D-1 over-burden	31.2	---	---	Destroyed by mining
24-D	15-9S-40E SESWSWSE	Stock	3425	17	Alluvium	11.8	---	---	Any drawdown from mining mitigated by recharge from Tongue River Reservoir
25-D	Same as Consol #24								
26-D	Same as Consol #25								
27-D	Same as Consol #26								
28-D	Same as Consol #27								
29-D	Same as Consol #29								
30-D	Same as Consol #30								
31-D	Same as Consol #32								
32-D	Same as Consol #33								
33-D	22-9S-40E NESENESE	Dom.	3460	170	D-1	41	---	Yes	Probably moderate to severe drawdown mitigated by recharge from Tongue River Alluvium

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
34-O	24-9S-40E NWNWNWNE	Stock	352D	140	O-1 upper	82	5	---	Oestroyed by mining
35-D	26-9S-40E SESENENW	Stock	349D	40	Overburden	15	36	---	Small to moderate drawdown
36-D	28-9S-4DE NWNESE	Stock	3475	600	sub O-2	---	1	---	Small to moderate drawdown
37-O	Same as Consol #39								
38-D	Same as Consol #42								
39-D	Same as Consol #43								
40-O	31-9S-40E SWSWNE	Stock	----	---	---	---	20	---	Small to moderate drawdown with recharge from Tongue River alluvium
41-D	36-9S-40E NESENE	Stock	3725	200	Above mine-able beds	19D.2	---	---	Probably no drawdown
42-O	6-9S-41E SWSESE	Stock	3498	73	O-1 lower	41.5	---	---	Severe drawdown
43-D	7-9S-41E NWSWSENE	Dom.	3515	110	---	64.1	---	---	Oestroyed by mining
44-D	7-9A-41E NWSWSW	Unused	3513	102	O-1 upper	79.2	---	---	Destroyed by mining
45-D	8-9S-41E SWNESW	Stock	353D	---	---	---	---	Yes	Destroyed by mining
46-D	8-9S-41E NWSESW	Stock	3550	1D5	D-1 upper	42.8	---	Yes	Destroyed by mining
47-D	9-9S-41E SWNWSWNE	Stock	3515	29	Alluvium	4.9	---	Yes	Possible moderate drawdown from mining if alluvial gravels in Oeer Creek are cut

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
48-D	15-9S-41E SENWNE	Stock	3550	26	Alluvium	4.7	---	---	Possible moderate drawdown from mining if alluvial gravels in Deer Creek are cut
49-D	17-9S-41E SWNWSW	Stock	3570	96	Overburden	26.3	---	---	Destroyed by mining
*** 138-SC	13-8S-39E BBC	Stock	4080	348	D-1, D-2	249	10	---	Possible small drawdown
139-SC	8S-39E 13BB	Stock	4040	300	----	---	10	---	Possible small drawdown
140-SC	8S-39E 14CBBD	Stock	3810	109+	D-1, D-2(?)	77	---	---	Small to moderate drawdown
141-SC	8S-39E 15BAD	Stock	3850	1151	----	---	---	---	Negligible drawdown
142-SC	8S-39E 17ADA	Stock	4110	---	Spring	Flowing	---	---	Negligible drawdown
143-SC	8S-39E 21DCAB	Stock	3900	40	Alluvium	8	---	---	Small to moderate drawdown
144-SC	8S-39E 22DCCD	Stock	3832	59	D-1 over-burden	19	---	---	Destroyed by mining
145-SC	8S-39E 23ABDA	Stock Unused	3770	40	Alluvium	30	---	---	Moderate drawdown
146-SC	8S-39E 24BBB	Stock	3785	218	Canyon Coal (?)	117	---	---	Moderate drawdown
147-SC	8S-39E 24BCDD	Stock Unused	3740	105	D-1, D-2	10	---	---	Destroyed by mining

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
148-SC	8S-39E 25DBDD	Stock	3665	50	O-1, O-2	10	---	---	Destroyed by mining
149-SC	8S-39E 26B0BA	Ab'd	3768	---	D-1 & over-burden	16	---	---	Destroyed by mining
150-SC	8S-39E 27AA	Stock Unused	3795	---	Alluvium	11	---	---	Destroyed by mining
151-SC	8S-39E 27C0C0	Stock	4095	53	Smith Coal	35	---	---	Slight drawdown
153-SC	8S-39E 33A0CC	Stock & Wildlife	4120	---	Spring	---	1	---	Negligible drawdown
160-SC	8S-40E 17D0AA	Stock	3662	200	sub D-2	135	---	---	Negligible drawdown from mining
161-SC	8S-40E 18B8AD	Stock	3845	303	sub O-2	177	4.5	---	Negligible drawdown from mining
162-SC	8S-40E 18BBB	Stock	3835	270	---	250	10	---	Negligible drawdown from mining
163-SC	Same as Decker #1								
164-SC	Same as Decker #2								
165-SC	8S-40E 31A80A	Stock	3615	145	O-2	96	---	---	Destroyed by mining
166-SC	8S-40E 32DAAD	Dom.& Stock	3540	81+	D-1 clinker	52	---	---	Severe drawdown
167-SC	Same as Decker #4								
168-SC	Same as Decker #5								

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
169-SC	8S-40E 33CBDB	Stock & Wildlife	3490	---	Spring	Flowing	35-50	---	Destroyed by mining
176-SC	9S-39E 14ACBC	Stock	3660	36	U-1 overburden	16	10-15	---	Moderate to severe effect from mining
177-SC	9S-39E 14DAD	Dom.	3550	185+	D-1, D-2	---	---	Yes	Moderate to severe effect from mining
178-SC	9S-39E 14DCBB	Unused	3647	391	sub D-2	161	6	---	Destroyed by mining
179-SC	9S-39E 21DD	Stock	4000	615	Shale, Coal	465	6	---	Destroyed by mining
180-SC	9S-39E 22CBC	---	4020	---	---	---	---	---	Negligible drawdown from mining
181-SC	Same as Consol #4								
182-SC	9S-39E 24BBD	Dom.	3620	235	SS, Coal Shale	88	10	---	Destroyed by mining
183-SC	Same as Consol #5								
184-SC	9S-39E 25DDB	Stock	3585	150	---	---	1-	---	Destroyed by mining
185-SC	9S-39E 25DDC	Stock (Unused)	3560	150	D-1 overburden	---	10	---	Destroyed by mining
196-SC	Same as Decker #18								
197-SC	9S-40E 5BB	Stock	3580	260	D-2, ss, sh	70	5	---	Probable small to moderate drawdown
198-SC	9S-40E 7CCAB	Stock	3720	274	D-1	138	50	---	Slight to moderate drawdown

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
Z14-SC	9S-40E 15DC	Irrig-ation	3435	53	Co, Sh	2	125	---	Minor drawdown with recharge from Tongue River Resevoir
Z15-SC	9S-40E 15DC	Irrig.	3436	53	Coal, Shale	2	125	---	Minor drawdown with recharge from Tongue River Reservoir
Z18-SC	9S-40E 16DAB	Ind. & Irrig.	3470	100	---	75	25	---	Destroyed by mining
Z19-SC	9S-40E 16DA	Ind. & Irrig.	3472	103	Shale, Coal	32	75	---	Destroyed by mining
Z28-SC	9S-40E 29CAD	Dom.	3540	115	SS, Sh, Co	20	30	---	Slight to moderate drawdown
Z33-SC	9S-40E 30BBD	Stock	3570	238	D-1	100	18	---	Small to moderate drawdown with recharge from Squirrel Ck. alluvium
****									
1-DS	8S-39E 33ADCC	---	4120	---	Spring All. & Clkr	---	1	Yes	Destroyed by mining
2-DS	8S-40E 33CBDB	---	3490	---	Spring, All., An-Dz-Clkr	---	35-50	Yes	Destroyed by mining

COMPLETE WELL & SPRING INVENTORY, DECKER AREA, MONTANA

Map Number	Location	Water Use	Elevation	Well Depth(Ft)	Aquifer	Depth to Static Water	Disch. gpm	Water Analysis	Effect of Mining
3-DS	8S-40E 34ACCA	---	3425	---	Spring An-Dz-Clkr	---	3-5	Yes	Severely affected by mining
4-DS	8S-40E 34DAAA	---	3405	---	Spring An-Dz-Clkr	---	100-150	Yes	Moderately affected by mining
5-DS	9S-40E 3DABB	---	3425	---	Spring, All., An-Dz-Clkr	---	15-25	Yes	Moderately to severely affected by mining
6-DS	9S-40E 11BBBD	---	3415	---	Spring An-Dz-Clkr	---	900-1000	Yes	Negligible effect from mining
7-DS	9S-41E 12BDCD	---	3685	---	Spring Alluvium	---	5	Yes	Negligible effect from mining

* 1-C From Consol Well and Spring Inventory

** 1-D From Decker Well Inventory

*** 138-SC From Spring Creek Well and Spring Inventory

**** 1-DS From Decker Spring Inventory

D-1	Dietz 1 Coal Seam
D-2	Dietz 2 Coal Seam
D-3	Dietz 3 Coal Seam
Cl	Clinker
Dz	Dietz Coal
An	Anderson Coal
Dom.	Domestic
Irrig.	Irrigation
Ind.	Industrial
Sh	Shale
SS	Sandstone
Co	Coal
SWL	Static Water Level
Ab'd	Abandoned

follows the slope of the land surface, away from topographically high areas toward the Tongue River where most of the shallow groundwater is discharged. Arrows on Figures 7, 8, 9 and 10 indicate the directions of groundwater flow in selected aquifers before and after three years of mining. Other features that seem to influence groundwater movement are the orientation of faults and fractures. Where fault planes are oriented parallel to the hydraulic gradient, the resistance offered to groundwater movement is not evident. However, where fault planes are perpendicular to the gradient, the effect on the gradient can be significant.

In the West Decker area, the flow of groundwater has been modified by excavation of the mine. The bottom of the mine is 40 to 50 feet lower than the normal stage of the reservoir, and the mine cut which is kept dewatered at all times has formed a groundwater sink lower in elevation than the reservoir. As a result, groundwater flow is from all directions toward the mine and hydraulic gradient in the area between the mine and reservoir has been reversed (USGS-Mont. DSL, 1977; Figure 9).

This same effect will occur in the North Decker extension area, although the flow patterns in that area have already been modified by the Spring Creek Mine to the northwest. Once mining has been completed in these three areas, groundwater will resume its flow toward the reservoir. Rates of flow will probably be similar to the premining rates, but chemical qualities of the waters will be permanently changed.

Chemical quality of the North Decker mine effluent will be similar to that of water currently passing through the proposed mine area. The effluent will be a mixture composed of waters from the D-1 clinker, D-1 coal and D-2 coal, and will chemically most closely resemble water from the D-1 clinker which will contribute the largest volume. Water quality monitoring at the West Decker mine effluent has shown no elevated concentrations of toxic elements.

Simultaneous operation of the West Decker, North Decker and East Decker mines will introduce effluents to the Tongue River Reservoir that must be evaluated as cumulative changes in river flow and quality. Figure 11 shows a mass balance combination of average annual Tongue River flows and selected chemical characteristics (1965-73) with estimated maximum effluent rates for the three mines in simultaneous operation. Under these most extreme conditions, addition of mine effluent waters does not seem detrimental to the chemical quality of the river.

After completion of mining and reclamation in the three proposed areas, groundwater flow patterns will adjust toward new equilibria dictated by postmining hydrogeologic controls. Some controls, such as recharge to the system, will not have changed because most recharge originates outside the mine and will not have been affected by mining. Configuration of the base of each mined area will be relatively

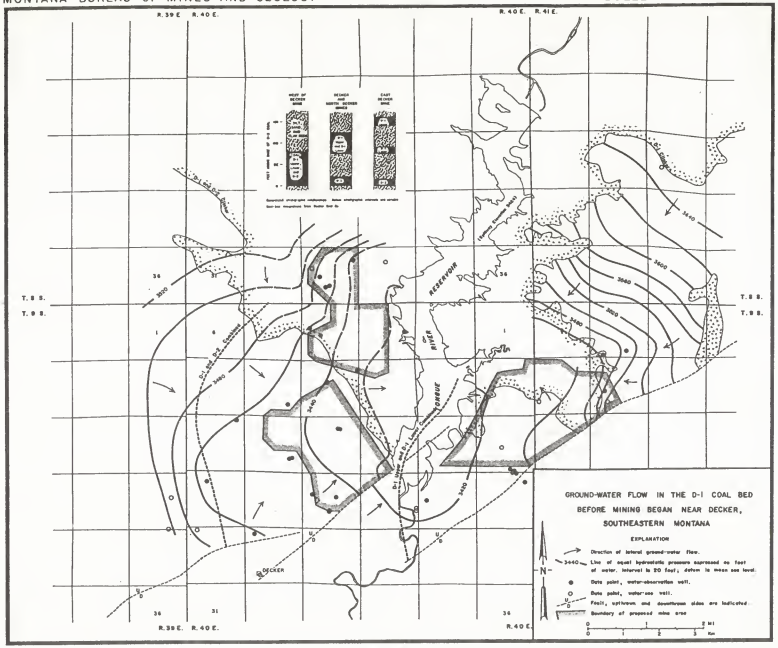
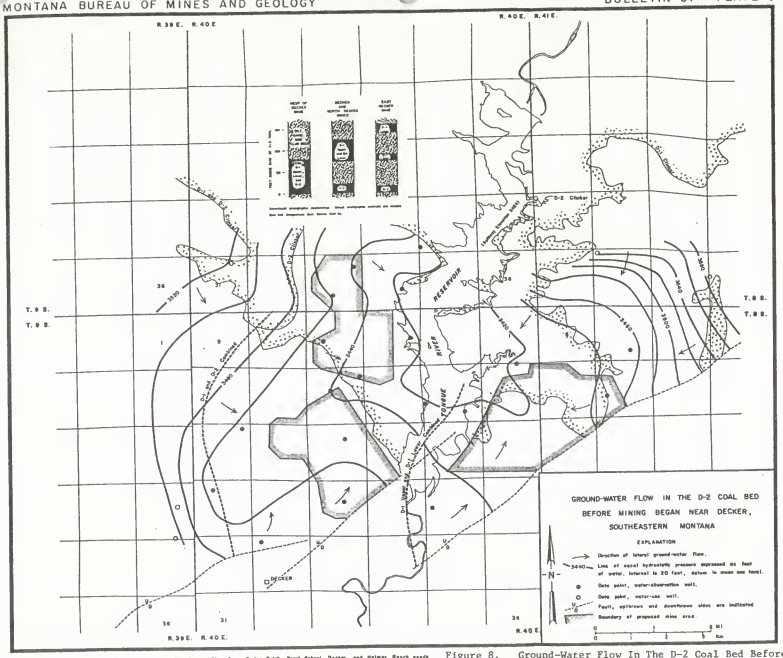
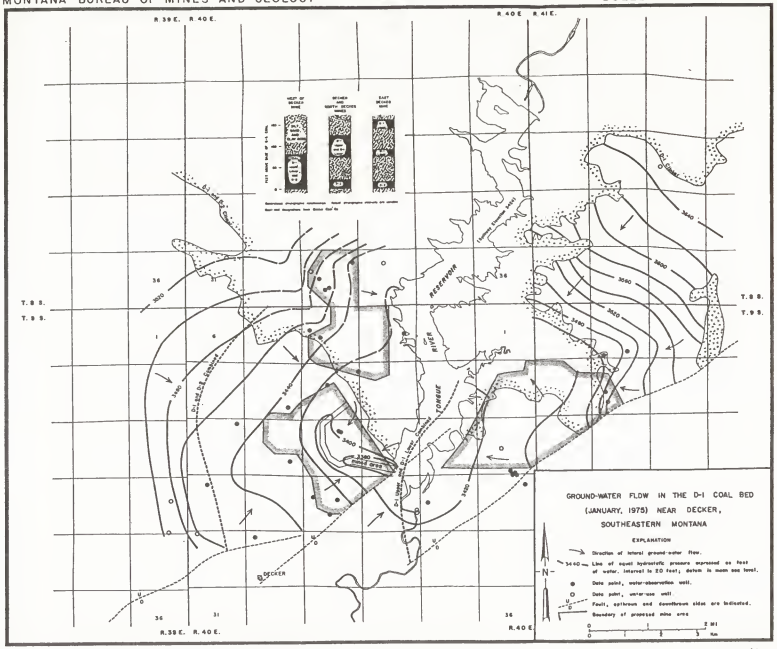


Figure 7. Ground-Water Flow in The D-1 Coal Bed Before Mining Began Near Decker, Southeastern Montana



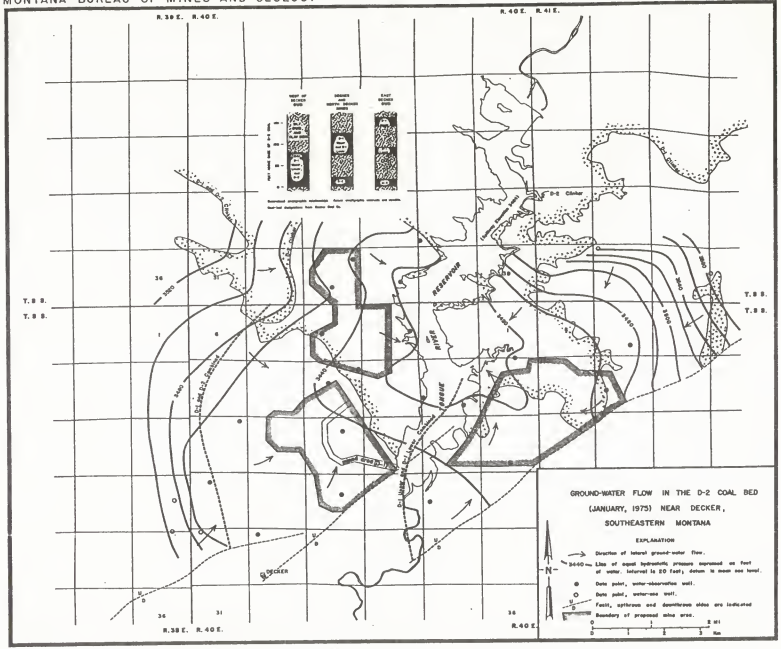
Base from U.S. Geological Survey 7 1/2 min. Half Moon Hill, Tongue River Dam, Spring Gulch, Pearl School, Decker, and Holmes Ranch quads

Figure 8. Ground-Water Flow In The D-2 Coal Bed Before Mining Began Near Decker, Southeastern Montana



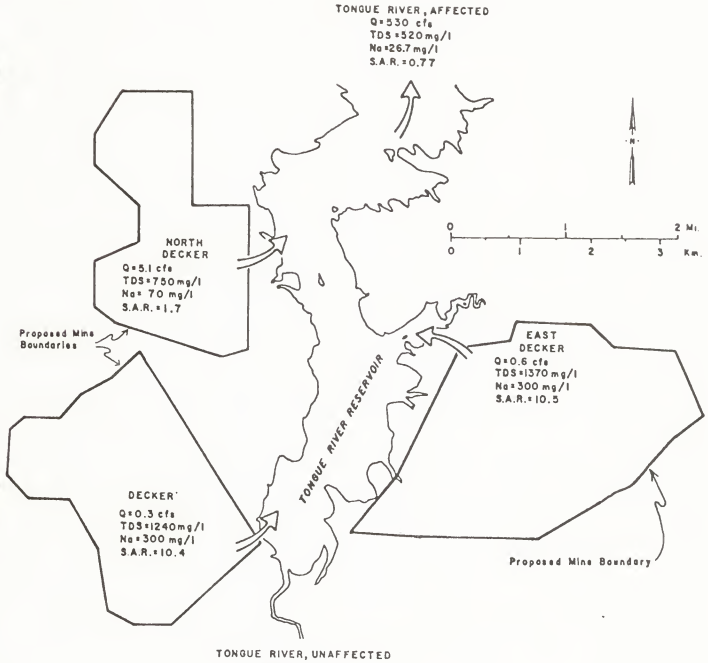
Base from U.S. Geological Survey 7 1/2 min Half Moon Hill, Tongue River Dam, Spring Gulch, Pearl School, Decker, and Holmes Ranch quads

Figure 9. Ground-Water Flow In The D-1 Coal Bed (January, 1975) Near Decker, Southeastern Montana



Base from U.S. Geological Survey 7 1/2 min. Hoff Steam Mill, Tongue River Dam, Spring Gulch, Pearl School, Decker, and Holmes Ranch quads.

Figure 10. Groundwater Flow in the D-2 Coal Bed (January 1975) near Decker, Southeastern Montana



Q = Average annual discharge in cfs (cubic feet per second)
TDS = Average annual concentration of total dissolved solids in mg/l (milligrams per liter)
Na = Average annual concentration of sodium in mg/l (milligrams per liter)
S.A.R. = Average annual sodium adsorption ratio

Figure 11—Mass balance of average annual Tongue River flow near Decker (1965-73) with hypothetical effluents from three active mines.

undisturbed and will strongly influence flow patterns above it. Base level for the entire system will remain the Tongue River water course. The main changes will be in the hydrologic characteristics of the materials within the mined areas. The complex combination of geologic materials disturbed by mining are placed as spoils behind the mining operation, thereby replacing the pre-existing aquifers, and introducing new physical and chemical factors in the hydrologic system.

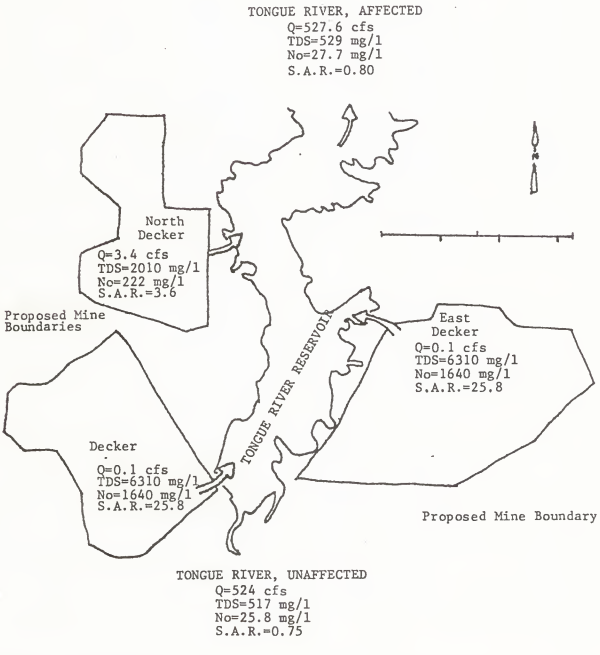
Disturbed materials in each mine area will be leached by groundwater flowing laterally and vertically through them. In other mines, a rubble layer at the base composed of wasted coal and boulders that have rolled off nearby spoils piles appear to have hydrologic characteristics similar to the pre-existing aquifer (Van Voast and Hedges, 1974). Whatever the actual postmining flow rates near Decker may be, they will not exceed the premining rates. Because of the current philosophy that groundwater quality can be degraded in mined areas (Van Voast, 1974), the maximum flow rates must be known in order to evaluate the maximum possible environmental effects.

Mining related research on water quality thus far indicates that leachates of spoils in mined areas will be more strongly mineralized than waters in undisturbed materials. Postmining waters at West Decker and East Decker are predicted to contain dissolved solids concentrations of about 6,000 mg/l (Figure 12) (Van Voast and Hedges, 1975). Mineral contents of leachates will probably increase when the material is disturbed, but it is likely that concentrations of dissolved solids (TDS) will not be more than twice those of the premining waters in the North Decker clinker. The best estimate is that postmining waters at North Decker will contain less than about 2000 mg/L of TDS (Figure 12) (Van Voast and Hedges, 1979).

The combination of premining water passing through the three proposed mine areas was estimated to be 3.6 cfs having an average TDS concentration of 800 mg/L. For the period of simultaneous mining operations at the three areas, the predicted flows total about six cfs having an average TDS of about 850 mg/L. After mining has been completed, predicted groundwater flow through the three areas is 3.6 cfs having an average TDS concentration of about 2750 mg/L.

When groundwaters resume the premining flow patterns toward the Tongue River, the approximate original flow rates will recur, but the chemical properties of the waters will be permanently changed. Based on postmining groundwater flow and quality predictions and historical river flow and water quality data (USGS, 1965-1973), the hypothetical average annual changes in river quality would be insignificant (Figure 12). An evaluation of the impact of mine waters during periods of maximum and minimum flows is unrealistic because of the highly variable TDS concentrations. A more reasonable approach would be evaluation for average monthly conditions (Table 6).

Figure 12- Mass balance of average annual Tongue River flow near Decker (1965-73) with hypothetical leachates from three mined areas (from VanVoast and Hedges, 1975)



Q=Average annual discharge in cfs (cubic feet per second)
TDS= Average annual concentration of total dissolved solids in mg/l (milligrams per liter)
No=Average annual concentration of sodium in mg/l (milligrams per liter)
S.A.R.=Average annual sodium adsorption ratio

Table 6 - Mass balance of hypothetical post-mining ground-water flow with mean discharges of Tongue River near Decker (period of record 1965-73, U.S. Geol. Survey).

TONGUE RIVER: WITHOUT MINED-AREA GROUND WATER (1965-73) and *WITH MINED-AREA GROUND WATER (HYPOTHETICAL)*

Month (1965-73)	Mean discharge (cfs)		Averages from monthly analyses composited by discharge: Dissolved solids (mg/l)		Sodium (mg/l)		Calcium (mg/l)		Magnesium (mg/l)		SAR	
Jan.	196	*200*	736	*763*	32.0	*36.8*	68.7	*70.4*	47.6	*48.3*	.8	*.9*
Feb.	295	*299*	684	*703*	30.1	*33.4*	63.9	*65.1*	44.3	*44.8*	.7	*.8*
Mar.	440	*444*	764	*776*	43.5	*45.6*	67.6	*68.4*	49.9	*50.2*	1.0	*1.1*
Apr.	413	*417*	759	*772*	44.8	*47.0*	65.0	*65.9*	49.5	*49.8*	1.1	*1.1*
May	1253	*1257*	476	*481*	22.1	*22.9*	47.9	*48.2*	26.7	*26.9*	.7	*.7*
June	1969	*1973*	287	*291*	12.5	*13.0*	31.2	*31.4*	14.1	*14.2*	.5	*.5*
July	504	*508*	489	*501*	27.0	*28.9*	45.1	*45.9*	29.6	*30.0*	.8	*.9*
Aug.	187	*191*	715	*744*	42.7	*47.6*	60.5	*62.5*	46.7	*47.5*	1.1	*1.2*
Sept.	276	*280*	643	*664*	33.9	*37.3*	58.5	*59.9*	43.3	*43.9*	.9	*.9*
Oct.	291	*295*	686	*705*	33.0	*36.3*	58.4	*59.7*	48.8	*49.3*	.8	*.9*
Nov.	256	*260*	716	*737*	37.4	*41.1*	56.4	*57.9*	52.1	*52.6*	.9	*1.0*
Dec.	203	*207*	742	*768*	35.7	*40.3*	67.9	*69.6*	50.5	*51.2*	.8	*.9*
Annual	524	*528*	517	*529*	25.8	*27.7*	46.5	*47.3*	31.7	*32.1*	.8	*.8*

Maximum possible post-mining ground-water flow, estimated: 3.6 cfs (cubic feet per second)
Dissolved solids concentration: 2250 mg/l (milligrams per liter)
Sodium concentration: 300 mg/l
Calcium concentration: 164 mg/l
Magnesium concentration: 88 mg/l
SAR (sodium adsorption ratio): 4.9

HYPOTHETICAL POST-MINING GROUND-WATER FLOW

Several options are available for the final treatment of the mined area and for the postmining land uses. Possible land uses that may have hydrologic significance are the two extremes: return of the areas to the original dry land conditions or conversion to irrigated pasture or cropland. Neither option should create significantly different hydrologic conditions. Dry-land use can have no foreseeable effect on the groundwater system. Irrigation of the West and East Decker areas would be equally non-detrimental if irrigation waters from the Tongue River or alluvium were used. Waters from unfilled final cuts would not be useable because of likely low yields and high SAR values. Application of irrigation water in excess amounts would generate somewhat greater volumes of more mineralized spoil leachates. The mined North Decker area could probably be irrigated with waters from final cuts or with reservoir water without detriment.

D. AIR QUALITY:

Degradation of air quality should be minimal due to fugitive dust control measures and other practices which are required in order to comply with the Montana Strip and Underground Mine Reclamation Act and Federal and State air quality standards.

E. VEGETATION:

Crucial impacts on vegetation due to mining in the Decker area are loss of vegetation diversity and lack of replacement of shrub and tree community types. The limited seed source and difficulty in establishing native shrub and tree species using general seeding practices has complicated the problem. Research studies have been initiated to provide state-of-the-art methods for shrub and tree reestablishment. Until these practices are implemented, permanent establishment of vegetation diversity and cover will be a slow process and impacts will linger for an indefinite period after mining has ended.

F. WILDLIFE:

In 1978, a conservation easement located between the West Decker railroad/highway corridor and the East Decker road/railroad corridor was set up to mitigate wildlife values lost by the utilization of the road/-railroad corridor along the North Extension (see letters dated October 13, 1978 from Scott to Juntunen and December 13, 1978 from Juntunen to Scott in Appendix B).

With successful reestablishment of native vegetation cover (especially shrub and tree stands) and diverse microhabitats (swales, rock piles, etc.), the impacts on wildlife should be lessened.

G. SOCIO-ECONOMIC:

The North Extension will require at the most 26 additional employees and so there will not be an appreciable effect in any socio-economic area other than public revenues.

IV. ALTERNATE MINING PLAN FOR THE NORTH EXTENSION AREA

In August 1976, Decker Coal Company applied for Federal leases in Section 34, T8S, R40E and in the E ½ Section 3, T9S, R40E, but delays due to the Federal Coal Lease Amendment Act of 1976 postponed the lease sale.

The leases were offered in the Spring of 1980 and Decker Coal Company did not successfully bid on the leases.

Decker Coal Company has reapplied for these coal leases under the Department of the Interior's short-term lease criteria. However, the short-term lease will not apply since these leases will be offered in the Powder River lease sale in April 1982. Decker has the option to obtain the leases at this time and then subsequently to file a permit amendment application to include the new area.

V. ADVERSE IMPACTS THAT CANNOT BE AVOIDED IF THE PROPOSALS ARE IMPLEMENTED

Please see FEIS, pp. 622-633.

VI. RELATIONSHIP BETWEEN SHORT-TERM USE OF MAN'S OWN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Please see FEIS, pp. 635-666.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Please see FEIS, pp. 648-652.

VII. CONSULTATION AND COORDINATION WITH OTHER AGENCIES AND INDIVIDUALS

Please refer to copies of correspondence on the following pages.

MONTANA HISTORICAL SOCIETY
HISTORIC PRESERVATION OFFICE
225 NORTH ROBERTS STREET • (406) 449-4584 • HELENA, MONTANA 59601

May 28, 1981

Mr. Donald A. Crane
United States Department of the Interior
Office of Surface Mining
Reclamation and Enforcement
Brooks Towers
1020 15th Street
Denver, CO 80202

Dear Mr. Crane:

Re: North Decker Mine.

I concur with your opinion that there are no sites eligible for listing in the National Register of Historic Places in the North Decker Mine area and that the northern and western buffer zone survey remain to be completed. Thank you for the opportunity to comment.

Sincerely,

Marcella Sherfy
Deputy SHPO

TAF/MS/det

cc: Dennis Hemmer
Montana State Lands

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Billings Area Office
Federal Building, Room 3035
316 North 26th Street
Billings, Montana 59101

IN REPLY REFER TO:
ES

April 13, 1981

Mr. Donald Crane
Office of Surface Mining
Brooks Tower
1020 15th Street
Denver, Colorado 80225

Dear Mr. Crane:

We have reviewed the new mining and reclamation plan (MT 0011-62-68) submitted by Decker Coal Company for the North Extension Mine in Big Horn County, Montana. The fish and wildlife portions of the plan appear to be complete and in compliance with Federal Fish and Wildlife laws and policy.

Sincerely,
/S/ Wally Steucke

Wally Steucke
Area Manager

cc: Regional Director, USFWS, Denver, CO (ENV)
Montana Department of State Lands, Helena, MT
Montana Department of Fish, Wildlife and Parks, Helena, MT

RECEIVED
APR 14 1981
STATE LANDS

IN REPLY REFER TO:

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
222 North 32nd Street
P.O. Box 30157
Billings, Montana 59107

M-49839 (912)

MAR 11 1981

Mr. Gary Amestoy
Department of State Lands
Helena, Montana 59601

Dear Mr. Amestoy:

We have received a lease application for 550 acres of Federal coal adjacent to Decker Coal Co. north extension mine permit area.

In order to determine whether the application meets the requirements of our emergency leasing regulations we need the following information:

First, a description of the area contained in Deckers' mine permit application for the north extension mine.

Second, the date the permit application was filed.

Third, the Departments schedule for processing the application and ar estimate of when a decision will be made.

If you have any questions call Ed Hughes, at 657-6474.

Sincerely yours,

Bill D. Noble
Chief, Division of Resources

United States Department of the Interior

GEOLOGICAL SURVEY

Conservation Division
100 East "B" Street, Room 4130
Casper, Wyoming 82601

Montana 057934-A
Montana 057934
Montana 061685
Montana 06770

FEB 27 1981

Memorandum

To: Regional Director, Office of Surface Mining

From: Conservation Manager, North Central Region

Subject: North Decker Extension Mine Plan, Decker Coal Co., Coal Leases Montana 057934, Montana 057934-A, Montana 061685, and Montana 06770

Our office has received and reviewed for completeness the subject mine plan which accompanied your memorandum of January 23, 1981. We have the following requests for additional data:

1. A list of major equipment to be employed in coal and overburden removal.

2. Total in place coal tonnages for the D_1 and D_2 coal seams.

3. An explanation of what factors are involved in the determination of the merchantability of the D_1 coal seam.

We have no other requests at this time.

FOR Timothy D. MacDonald
Dwayne E. Hull

ONE HUNDRED YEARS OF EARTH SCIENCE IN THE PUBLIC SERVICE

IX. References

1. Consolidation Coal Company, 1981, Surface Mine Permit Application for Proposed CX Ranch Mine, Big Horn County, Montana: 14 volumes

2. Decker Coal Company, 1981, Surface Mine Permit Application for Proposed North Decker Mine, Big Horn county, Montana, Vol. 1

3. Montana Department of State Lands, 1980, Draft Environmental Impact Statement on the Proposed Mining and Reclamation Plan for the West Decker Mine Extenstion, Big Horn County, Montana.

4. Spring Creek Coal Company, 1979, Application for Surface Mining Permit, Application No. 00050, Amendment 1, Volumes 1-6, Environmental Baseline Study, Volumes 1 and 2.

5. Spring Creek Coal Company, 1981, South Fork Spring Creek Amendment Application, Volumes 1 and 2.

6. U.S. Geological Survey, 1965, (and annually thereafter), Water Resources data for Montana. Part 1, Surface water records, Part 2, Water-quality records: U.S. Geological Survey, Helena.

7. U.S. Geological Survey, Department of the Interior, Montana Department of State Lands, 1977, Final Environmental Impact Statement, Proposed Plan of Mining and Reclamation, East Decker and North Extension Mines, Decker Coal company, Big Horn County, Montana, vol. I, Tex; Vol. II, Appendices

8. U.S. Geological Survey, Department of the Interior, Montana Department of State Lands, Final Environmental Statement, Proposed Mining and Reclamation Plan, Spring Creek Mine, Spring Creek Coal Company (A subsidiary of NERCO, Inc.) Big Horn County, Montana on Federal Lease M-069782.

9. Van Voast, W.A., 1974, Hydrologic Effects of Strip Coal Mining in Southeastern Montana - Emphasis: one year of mining near Decker, Montana, Bureau of Mines and Geology Bull. 93, 24 p.

10. Van Voast, W.A., and Hedges, R.B. 1974, Hydrology of Western Energy Company's Probably Mine Areas near Colstrip, Southeastern Montana: Montana Bureau of Mines and Geology Open File Report, Butte, Billings.

11. Van Voast, W.A., and Hedges, R.B. 1975, Hydrogeologic Aspects of Existing and Proposed Strip Coal Mines Near Decker, Southeastern Montana: Montana Bureau of Mines and Geology, bull. 97, 31 p.

X. APPENDICES

DEPARTMENT OF STATE LANDS

THOMAS L. JUDGE, GOVERNOR

CAPITOL STATION

STATE OF MONTANA

(406) 449-2074 LEO BERRY, COMMISSIONER

1625 ELEVENTH AVENUE
HELENA, MONTANA 59601

November 28, 1979

RETURN RECEIPT REQUESTED
Certified Mail No. 22138

Mr. David A. Shelso
Environmental Coordinator
Decker Coal Company
1000 Kiewit Plaza
Omaha, Nebraska 68131

Re: Application for Permit Number [redacted]

Dear Mr. Shelso;

Attached is a complete listing of the deficiencies in application 00026 referenced in my letter of October 11, 1979. Included are all deficiencies with regard to the Department's current regulations. This listing does not include comments of the Office of Surface Mining.

Also attached is the Department's revised alluvial valley floor determination for Spring Creek.

If you have any questions on any of the attached items feel free to contact me.

Sincerely,

Dennis Hemmer, Chief
Coal & Uranium Bureau
Reclamation Division

xc: Jack Reed
Dave Jennings
Sam Scott
E. Gary Robbins
Don Crane
John Hardaway
Mike Bishop
Brace Hayden

lw

North Decker Alluvial Valley Floor Assessment

The key element of the North Decker alluvial valley floor decision is the amount of flow available from Spring Creek or Pearson Creek. Under the first analysis completed by the Department of State Lands, the Hedman and Kastner channel geometry flow prediction technique was used to predict an annual flow of 1,526 acre feet of discharge. After Mr. Hedman's visit to the Spring Creek site, he concluded that his method was not suited to the ephemeral Spring Creek and Pearson Creek drainage. The Department then opted to use a channel geometry flow prediction technique developed by Hugh Lowham, using measurements taken by Mike Bishop, John Hardaway and Dan Kimble. The channel width measurement of 19.7 feet, when used in the flow prediction equation, produced a calculated value of 1,520 acre feet per year, which is essentially the same value as that predicted by the Hedman-Kastner technique.

Decker Coal Company objected to the value calculated for flow in the Spring Creek drainage. The Department decided to solicit the assistance of the author of the flow prediction technique, Hugh Lowham, to verify or correct the channel geometry channel measurements that wer taken by Departmental and OSM staff members prior to a major standoff between regulatory and industry personnel. During Mr. Lowham's visit to the Spring Creek site, he measured a channel width ranging from 6.5 feet to 9 feet, with the most representative measurement being approximately 7 feet in width. Using the 7 foot measurement, an annual flow of 157 acre feet per year is calculated with the potential to irrigate 30.49 acres.

It appears that after using the technical approach selected to evaluate flood irrigation potential that the lower Spring Creek Valley is not an alluvial valley floor because it does not meet the definition of an alluvial valley floor. Section 701(1) of P.L. 95-87 states that, "alluvial valley flloors' means the unconsolidated streamlaid deposits holding streams where water availability is sufficient for subirrigation or floor irrigation agricultural activities. . ." The water available to irrigate 30 acres would not be enough for a farmer to justify a diversion and irrigation system based on conversations with S.C.S. personnel.

It is therefore the Department's determination that neither Spring Creek nor Pearson Creek qualify as alluvial valley floors due to insufficient water for subirrigated or flood irrigated agricultural activities.

GENERAL OFFICE:
Sheridan, Wyoming 82801
P. O. Box XXX 3049

MINE OFFICE:
Decker, Montana 59025
P. O. Box 12

DECKER COAL COMPANY

P. O. BOX XXX 3049
SHERIDAN, WYOMING 82801

TELEPHONE 307/672-3401

Address reply to: GENERAL OFFICE

October 13, 1978

File N. Decker

Mr. Richard Juntunen
Department of State Lands
Capitol Station
Helena, Montana 59601

Dear Dick,

In accordance with your letter of October 4, Decker Coal Company agrees to commit all lands under its control between the West Decker railroad/highway cooridor and the East Decker access road/railroad corridor (as outlined on the attached map) to a conservation easement.

Decker Coal Company will allow no grazing of livestock on its lands in the area. Any management in the designated area will be to enhance wildlife values. No Management plans will be initiated without the prior approval of the appropriate agencies.

Decker Coal Company reserves the right of normal access to the Tongue River Reservoir for the purpose of developing agriculturally related water projects.

This agreement will extend through the life of the planned [redacted] Extension Pit.

If you have any questions, feel free to contact me any time.

Sincerely,

DECKER COAL COMPANY

Sam J. Scott
Reclamation Department

SJS/dr

cc: John Gable, Bob K. Gjere, Leonard Skretteberg, Jack Reed, Dean Skalla, Mike Arne (NERCO)

Enc.

December 13, 1978

Sam Scott
[redacted]
P.O. Box 12
Decker, MT 59025

Re: [redacted] railroad/highway corridor and conservation easement

Dear Sam,

Pursuant to your letter and map submitted October 13, 1978, concerning the establishment and maintenance of a wildlife specific "conservation easement" on the land between the West Decker railroad/highway corridor and the East Decker road/railroad corridor, the Department of State Lands approves your plan.

The conservation easement should mitigate for the wildlife values lost by utilization of the Decker road/railroad alignment at the North Decker mine.

Sincerely,

Richard Juntunen
Assistant Administrator
Reclamation Division

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